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Case Report

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Physiotherapy outcomes following latissimus dorsi tendon transfer in a patient with massive rotator cuff tear: a case report

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ABSTRACT

This study aims to evaluate the early-term rehabilitation outcomes of a 63-year-old female patient who underwent latissimus dorsi transfer following a massive rotator cuff tear. Rotator cuff tears typically occur in individuals over middle age due to degenerative causes, while in younger individuals and athletes, they can be a result of trauma. These tears can lead to symptoms such as pain, muscle weakness, and limited range of motion. While conservative treatments are generally effective, surgical intervention may be necessary in some cases. Latissimus dorsi tendon transfer is a surgical procedure used to restore active external rotation of the shoulder in massive tears. This method provides an alternative treatment option. This study presents the early-term rehabilitation outcomes of the patient.

Keywords: Latissimus dorsi tendon transfer, shoulder rehabilitation, shoulder surgery, rehabilitation program, rotator cuff tear

INTRODUCTION

Rotator cuff tear (RCT) is a common problem in the shoulder joint, typically seen in individuals over middle age due to degenerative changes, while in younger individuals it can occur as a result of trauma or repetitive movements, and it can also be observed in athletes. Rotator cuff injuries can be caused by mechanical factors such as heavy lifting or repetitive motions, as well as genetic factors such as aging and gender. Following these injuries, patients may experience pain, muscle weakness, and limited range of motion.[1]

RCT can be treated with various conservative methods including physical therapy, corticosteroid injections, Platelet Rich Plasma, and nonsteroidal anti-inflammatory drugs. However, surgical intervention may be required in cases of massive RCT. [2] The surgical approach can vary depending on the type and size of the tear, the patient's age, and activity level.[3] Surgical methods may include arthroscopic debridement, lower trapezius and pectoralis major transfers, arthroscopic complete repair, reverse shoulder arthroplasty, and also the consideration of latissimus dorsi tendon transfer (LDTT).

LDTT is used as a surgical procedure for massive, irreparable RCT to restore active external rotation of the shoulder. The latissimus dorsi muscle is detached from the crest of the lesser tuberosity and transferred to the greater tuberosity, losing its internal rotation function and exhibiting external rotation capability.[4] The latissimus dorsi tendon becomes a large, well-vascularized tendon that applies an external rotational moment and allows for more effective movement of the deltoid muscle[5]. As a result, it provides an alternative method for the treatment of rotator cuff tears. However, complications such as hematoma, anchor pull-out, and nerve damage may occur after latissimus dorsi transfer. Therefore, it may not be a suitable treatment option for every patient.[4]

Upon reviewing the literature, an adequate number of studies focusing on the postoperative rehabilitation of patients who underwent LDTT was not found. This study presents the early outcomes of a patient who underwent LDTT and participated in a physiotherapy and rehabilitation program.

CASE REPORT

A 63-year-old female patient with a RCT admitted to the Orthopedics Clinic at Kırşehir Ahi Evran University Education and Research Hospital. The patient was diagnosed

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as RCT with magnetic resonance imaging and clinically continuity test by a orthopedic specialist specialized in shoulder (ÇB).

Surgery Procedure

For LDTT, the procedure begins with an initial glenohumeral arthroscopy. This involves using standard anterior, lateral, and posterior portals to examine the joint for arthritis, biceps lesions, and subscapularis tendon tears. If a subscapularis tear is present, it is repaired, while biceps tenotomy or tenodesis is performed for tendon degeneration or instability. The size and extent of the RCT and the mobility of the torn cuff are assessed. If the RCT is confirmed to be irreparable with full involvement and retraction of the supraspinatus and infraspinatus, and remains immobile even after thorough arthroscopic release, a limited subacromial decompression is performed. This aims to create a smooth acromial undersurface and debride the lateral aspect of the greater tuberosity to prepare a suitable surface for graft-bone healing. After completing the arthroscopy, the focus shifts to graft harvesting. The shoulder is placed in maximum abduction and the elbow in 90 degrees of flexion. A 5-cm longitudinal incision is made over the posterior axillary crease to approach the latissimus dorsi muscle through blunt dissection. Any soft tissue adhesions between the teres major and latissimus dorsi are released. The latissimus dorsi muscle is then dissected sharply from its insertion on the humerus, ensuring maximum tendon excursion. Care is taken to protect the pedicle of the muscle located at the ventral aspect. The fascia lata autograft, commonly used to augment latissimus dorsi tendon transfers, is harvested through an 8-cm longitudinal incision on the lateral aspect of the thigh. An 8x4-cm fascia lata graft is obtained, folded over to create a double-layered 4x4-cm autograft, and tubularized. It is then fixed around the end of the latissimus dorsi tendon using nonabsorbable no. 1 sutures. Once the augmented tendon is ready for transfer, a curved hemostat is inserted through the anterior arthroscopy portal, and a blunt dissection is performed to create a plane between the teres minor and posterior deltoid muscle. Tactile feedback from the index finger through the axillary incision is used for guidance. The sutures on the leading edge of the tendon are retrieved through the anterior portal along the developed plane, with arthroscopic visualization from the lateral portal. With the arm at 30 degrees of abduction and external rotation, the transfer is achieved by fixing the augmented tendon over the lateral and anterior aspects of the greater tuberosity using two knotless anchors (Footprint Ultra PK; Smith & Nephew, Andover, MA, USA), applying optimal tension.[6]

Rehabilitation

A total of 6-weeks (five days, per a week) physiotherapy program following immobilization bandage (**Figure 1**) was applied to the patient. 20 minutes of cold application, 20 minutes of conventional TENS (transcutaneous electrical nerve stimulation) therapy within the frequency range of 60-120 Hz, soft tissue massage for the deltoid and biceps muscles (3 minutes), mobilization exercises for the scapula and glenohumeral joint (Grade A-B), standing exercises involving towel sliding against a wall and wall dusting, assisted bilateral shoulder elevation up to 120° using a wand, progressive abduction angles with external rotation after the 9th week, internal rotation during abduction, horizontal adduction, and functional internal rotation exercises (placing the hand on the lower back or higher), strengthening training in supine and lateral positions with elbow flexion to maintain rotator cuff/deltoid balance, finger ladder exercises, strengthening exercises in the "Full Can" position with a 0.5 kg weight for thumb elevation, closed kinetic chain exercises in a static quadruped position, isometric exercises for the periscapular muscles, deltoid, and trapezius, posterior capsule stretching, kinesiotaping (**Figure 1**).

Figure 1. Immobilisation bandage

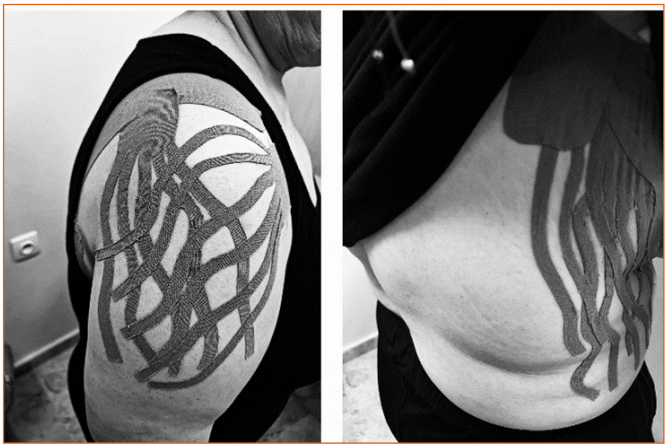

Figure 2. Kinesiotaping for shoulder edema

Outcome measurements

Patient was assessed by surgeon for both pre- and post-rehabilitation periods. Following reliable test and culturally adapted scales were used for assesment.

- Universal Goniometer for range of motion (**Table 1**).
- Visual Analog Scale for pain assessment (**Table 2**).
- Disabilities of the Arm, Shoulder, and Hand questionnaire and Revised Oxford Shoulder Score for upper extremity functionality (**Table 2**).

DISCUSSION

The aim of this case presentation was to examine the early rehabilitation outcomes in terms of pain and functionality in a patient who underwent LDTT. The results obtained indicate that the physiotherapy program following LDTT in patients with massive rotator cuff tears has a positive contribution,

Figure 3. Shoulder ROM exercises (abduction in side-lying position, flexion-abduction in supine position) B. Wand Exercises (flexion and abduction directions) C. Pendulum exercise, biceps brachii strengthening

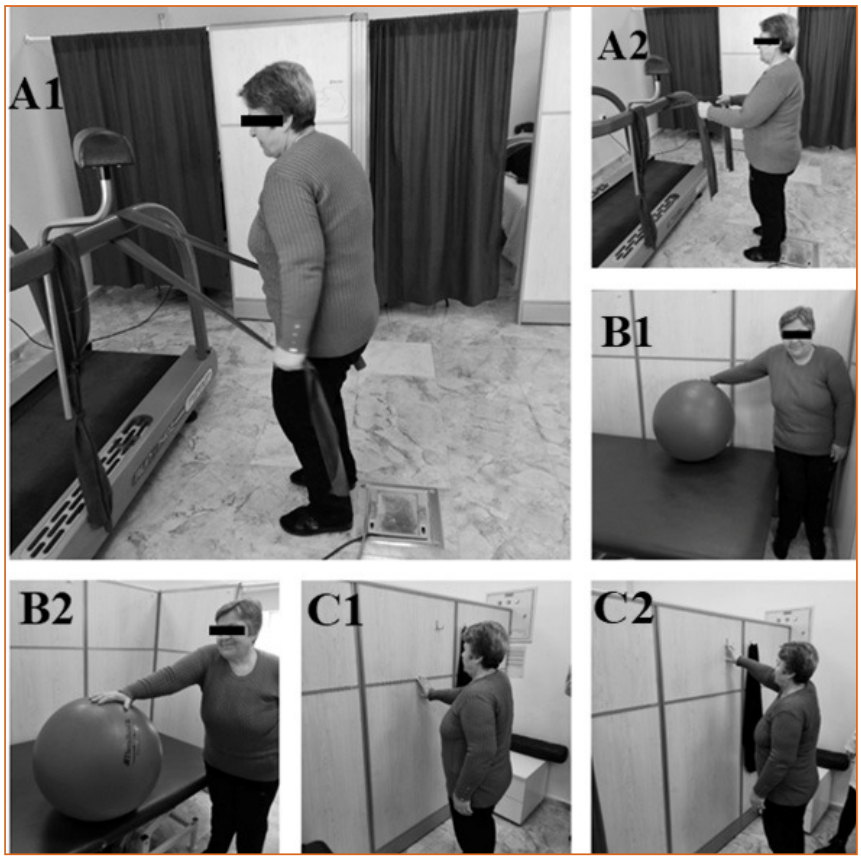

Figure 4. A1-A2: Resistance shoulder strengthening with elastic band, B1-B2: Lying activities with ball, C1-C2: Wall climbing exercise.

Table 1. Shoulder joint ROM measurements								
ROM (°)	Initial Assessment				Final Assessment			
	Active		Passive		Active		Passive	
	Right	Left	Right	Left	Right	Left	Right	Left
Flexion	20	170	132	180	160	170	170	180
Abduction	35	180	90	180	70	180	120	180
External Rotation	32	90	20	90	65	90	60	90
Internal Rotation	60	90	40	90	80	90	65	90

ROM: Range of motion

Table 2. Evaluation Parameters		
Method	Before Treatment	After Treatment
VAS		
Rest	3	0
Activity	8	5
DASH (0-100 points)	76,66	58,33
ROSS (0-45 points)	42	25

VAS: Visual Analog Scale, DASH: Disabilities of the Arm, Shoulder and Hand, ROSS: Revize Oxford Omuz Skoru

particularly in terms of shoulder external rotation. These findings are consistent with other studies in the literature. Gerber et al.[7] found in their study that LDTT was effective in reducing the limitation of active external rotation in patients with massive rotator cuff tears. Additionally, Irlenbusch et al.[8] observed that a comprehensive physiotherapy program applied after LDTT in patients with rotator cuff tears resulted in increased shoulder range of motion and muscle strength in the shoulder girdle. Strengthening exercises and range of motion exercises can assist in strengthening the shoulder muscles and improving range of motion. However, the success of the physiotherapy program depends on the patient's correct execution of exercises and their motivation.[9]

CONCLUSION

LDTT appears to be an effective treatment option for patients with massive rotator cuff tears, and when combined with a physiotherapy program, it leads to improvements in range of motion and strengthening. This study demonstrates that LDTT and a physiotherapy program can be effective choices in the treatment of patients with massive rotator cuff tears.

ETHICAL DECLARATIONS

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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